

Roots, Radicals, and Rational Exponents

Warm-up: Fill in the table below as a reference.

x	x^2	x^3	x^4	x^5
1				
2				
3				
4				XXXXXXXXXXXXXXXXXXXX
5				XXXXXXXXXXXXXXXXXXXX
6			XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX
7			XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX
8			XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX
9			XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX
10			XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX

Term	Definition
Nth Root	
Index	
Radical	
Radicand	
Principal Root	
Fractional Exponents	

Property of Exponents	Specific Example	General Example
Multiplication Property		
Division Property		
Power of a Power Property		
Negative Exponent Property		

Examples: Find the principal real roots.

1. $\sqrt[3]{125}$ 2. $\sqrt[4]{16}$ 3. $\sqrt[4]{81}$ 4. $\sqrt[3]{64}$ 5. $\sqrt[3]{-1000}$ 6. $\sqrt[3]{-27}$ 7. $\sqrt[3]{-512}$

Examples: Simplify.

8. $27^{\frac{2}{3}}$ 9. $25^{\frac{1}{2}}$ 10. $32^{\frac{2}{5}}$ 11. $16^{\frac{1}{4}}$ 12. $32^{-\frac{3}{5}}$ 13. $27^{-\frac{1}{3}}$ 14. $-16^{\frac{3}{4}}$

15. $\sqrt[5]{32m^{15}}$ 16. $\sqrt[4]{x^{20}y^8}$ 17. $\sqrt[3]{-8a^3b^9}$ 18. $\sqrt[4]{256x^{12}y^{24}}$

Examples: Solve for x.

19. $2x^5 = 64$

20. $5x^3 = 320$

21. $2x^4 = 162$

22. One cube-shaped container has an edge length 2 cm longer than the edge length of a second cube. The volume of the larger cube is 729 cubic cm. When the larger cube empties into the smaller cube, how much water will spill?

